GOVERNMENT STATUS REPORT

AUSTRALIA

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ABSTRACT

This paper reviews the Australian Department of Transport and Regional Services' involvement in reducing road trauma both in the domestic and international arena since the 17th ESV in Amsterdam, The Netherlands. The paper the will focus on the following points:

- The road toll
- National Road Safety Strategy
- International Harmonised Research Activities (IHRA) Working Groups
- Intelligent Transport Systems
- International Harmonisation

THE AUSTRALIAN ROAD TOLL

After significant improvements in the early 1990s and a further substantial improvement in 1997 that achieved the lowest annual Australian road toll since 1950, the toll has thereafter remained fairly static. There were 1,726 fatalities in 2002, an improvement of only 2.3% on the result in 1997.

As a result, Australia has fallen behind schedule in meeting the aim set out in the National Road Safety Strategy 2001-2010 of reducing the number of road fatalities per 100,000 population by 40%, from 9.3 in 1999 to no more than 5.6 in 2010. For Australia to have been on track to achieve that target, road fatalities should have been no more than about 1,635 in 2002.

Of specific concern is the uneven pattern of improvement. Whereas fatalities amongst pedestrians and bicycle riders in 2002 were respectively 24% lower and 33% lower than in 1997, fatalities amongst vehicle occupants and motor cycle riders were respectively 0.7% higher and 26% higher than in 1997.

The substantial reduction seen in pedestrian fatalities suggests that the national focus given in recent years to speed reduction in urban areas is paying dividends. The speed reduction efforts have centred on increased intensity and sophistication of compliance enforcement and on the widespread lowering of speed limits (from 60 km/hr to 50 km/hr) on urban residential streets throughout Australia.

Since 1997, vehicle occupant fatalities have increased significantly amongst male drivers and passengers (up 9.1% and 6.6% respectively). In contrast, this period saw substantial reductions in fatalities amongst female drivers and passengers (down 15.0% and 12.8% respectively).

It is not known to what extent the failure to reduce vehicle occupant fatalities reflects an increased mismatch of vehicle masses and profiles in the Australian passenger vehicle fleet stemming from the recent popularity of Four-Wheel Drives (4WDs). This popularity is evident in data on new vehicle sales to the Australian market: some 116,236 new 4WDs were sold in 2001 compared with 44,643 in 1993.

NATIONAL ROAD SAFETY STRATEGY

The National Road Safety Strategy 2001-2010 was approved in November 2000 by Transport Ministers, meeting as the Australian Transport Council. This ten-year Strategy and associated two-year Action Plans provide a framework for coordinating the road safety initiatives of Commonwealth, State, Territory and local governments, as well as other organisations capable of influencing road safety outcomes.

The aim of the National Strategy is to reduce Australia's road fatality rate per 100,000 population by 40%, from 9.3 in 1999 to no more than 5.6 in 2010. However, little progress towards this target has been made to date. The annual number of road deaths has, in fact, been fairly constant since 1997.

During 2002, a Task Force of officials from all jurisdictions was appointed to develop a new Action Plan, drawing on specialist advice from leading road safety researchers. The resulting National Road Safety Action Plan for 2003 and 2004 was endorsed by Transport Ministers and came into effect from January 2003.

The Action Plan is designed to provide a clear focus on areas where there is potential to achieve a significant impact on road trauma within the next few years, and others that will lay the groundwork for longer term gains. These priority areas include:

- speed management
- measures to improve the safety of roads (including both black spot programmes and targeted "mass application" of cost-effective measures)
- driver impairment (alcohol, other drugs and fatigue)
- vehicle measures
- licensing and driver management.

The experts consulted in the preparation of the Plan strongly concluded that the 2010 fatality target is still achievable, providing there is adequate attention given to these key areas. In particular, the rate of progress will depend critically on action taken in the areas of speed management and the road environment.

While the Plan represents a national agreement on road safety priorities for the next two years, it is recognised that the specific mix of measures adopted by individual State and Territory jurisdictions will need to reflect local circumstances.

The Action Plan will be subject to review by the Australian Transport Council at the end of 2003.

INTERNATIONAL HARMONISED RESEARCH ACTIVITIES

The International Harmonised Research Activities (IHRA) steering committee was formed at the 1996 Enhanced Safety of Vehicles (ESV) Conference in Melbourne. IHRA comprises of government vehicle safety regulators from around the world and is tasked to work towards an agreed research agenda to avoid duplication of vehicle safety research.

The 17th ESV in Amsterdam marked the completion of IHRA's first 5-year term. At that time, the IHRA Steering Committee decided to combine the frontal and compatibility working groups. The 5 current IHRA working groups are:

- Side Impact
- Advanced offset frontal and Vehicle compatibility
- Biomechanics
- Pedestrian safety
- Intelligent Transport Systems

SIDE IMPACT CRASH PROTECTION

At the 16th ESV in Windsor, the IHRA steering committee agreed to the addition of the IHRA Side Impact Working Group (SIWG) under the chairmanship of Australia. The SIWG held it's first meeting in September 1998.

The detailed report on the status of work of the IHRA Side Impact Working Group (SIWG) will be given in the Side Impact Technical session during this 18th ESV conference.

To determine the side impact trauma problem, the group began by examining real world crashes in the 3 major geographical regions - North America, Europe and Asia-Pacific, to identify:

- types of side impact crashes occurring
- injuries being sustained by body region
- causes of these injuries, where possible
- characteristics of the drivers and passengers most at risk (gender, size, seating position, etc)

Members were asked to report on any research that examined the effects on injury risk of mass, stiffness and geometry of striking vehicles together with any other parameters that were considered important for side impact protection.

There has been close cooperation between the SIWG and IHRA working groups on advanced frontal, vehicle compatibility and biomechanics, and with the WorldSID Task Group who have been developing the requirements for a harmonised side impact test dummy.

After reviewing the available research data, members proposed a four-part test procedure that includes:

1. Two mobile deformable barrier test.
2. Vehicle to pole test.
3. Out-of-position side airbag evaluation tests.
4. Interior headform test.

Mobile Deformable Barrier Test

Defining the parameters of the MDB test was the most challenging task for the group. While the group was hopeful of recommending only one MDB test, it became clear that this would be difficult because of the fleet differences between regions around the world.

In North America, light trucks and vans (LTVs) currently account for approximately 50% of all new light vehicle sales (cars, light trucks and vans). This category includes the so-called Sport Utility Vehicles (SUVs) and 4WDs. In other regions there has been an increase in the popularity of "soft-roaders"/small 4WDs, although not to the same extent as North America. While smaller and lighter than traditional 4WDs, their high geometry front structures present similar problems to vehicles they strike.

Therefore, the group is recommending that two MDB test procedures be taken into the validation phase which may result in further refinements:

1. An MDB test using a barrier based on a passenger car/small 4WD type bullet vehicle. This will initially be the Advanced European (AE)-MDB test procedure currently being developed by the EEVC.

2. An MDB test using a barrier based on a LTV type vehicle. This will initially be the Insurance Institute for Highway Safety (IIHS) MDB test procedure currently being used by the IIHS.

The group noted that:

- A single "worst case" test would be the ideal for harmonisation. However, this could only be achieved if the more severe of the proposed tests could be guaranteed to provide at least the same degree of protection for all significant body regions as generated by the less severe test. Even then, it would be difficult for countries without a large fleet of LTVs to justify a worst case test at the stringency of the proposed IIHS test.
- By taking at least 2 draft test procedures (ie the new draft AE-MDB and the IIHS MDB) into the validation phase, there would be some latitude to develop and select appropriate tests for the different fleet mixes and to examine whether the worse case test option is feasible.

A summary of these two draft test procedures follows.

IIHS Deformable Barrier The IIHS barrier has been developed to represent the front end profile of about 68% of new SUV sales in the USA.

NHTSA is evaluating the IIHS barrier and while it does have some concerns about its design, the concept of representing an SUV and being able to generate a head impact is not far removed from current NHTSA thinking for a new MDB. The Europeans are not interested in such a high, homogeneous deformable barrier because they believe the SUV problem is unique to North America. The Japanese also share this view but have conducted SUV-to-car and IIHS MDB-to-car tests to examine how representative the IIHS barrier is of an SUV-to-car test. IIHS testing indicated that the trolley mass did not make much difference to the injury outcome in side impact, therefore the trolley mass has been set at 1500 kg.

While Australia does not have the same population of SUVs as North America, sales of small SUVs or "soft-roaders" has increased significantly in Australia recently. Since Australia believes that it is the geometry rather than mass and stiffness of the striking vehicle which has the greatest effect on injury outcome, Australia is willing to consider an MDB test that simulates a high vehicle provided it can be shown to guarantee protection against passenger car bullet vehicles.

AE MDB The EEVC has been working on a new deformable barrier design. The intent is not to reproduce a particular accident scenario, but rather generate a set of conditions that encourage remedial measures in the struck vehicle that will work in a range of crashes. The EEVC advised that the stiffness distribution was chosen to match the "dimple" effect on the struck car seen in real world crashes in Europe.

The AE-MDB face has been designed, wider than current faces, with the intention of loading both the front and rear dummies. The stiffnesses of the blocks for the MDB were based on rigid load cell wall impacts, mainly undertaken in Japan by JARI. After careful consideration, it was decided that rigid impacts would give a more representative value for the front stiffnesses of cars as seen by the struck car in side impacts.

The AE-MDB face design uses aluminium honeycomb of increasing stiffness with crush. The trolley mass is the same as the IIHS MDB at 1500 kg.

Pole Impact Test

The real world crash data clearly indicated that vehicle impacts into narrow objects was an area that needed to be addressed. There was considerably more consensus on the requirements of a vehicle to pole test procedure than for the MDB test. The following has been proposed:

- Moving vehicle to pole test.
- Oblique impact @ 75 degrees to the longitudinal plane of the test vehicle
- Speed of 32 km/h.
- Pole impact to evaluate at least head and thorax protection.
- Mid-sized adult male test device.
- Rigid pole diameter of 254 mm.
- Pole to span at least below sill height to above roof height.

This test procedure is intended to simulate real world side crashes with narrow objects such as trees and poles. The goal is to utilise an oblique pole side impact test procedure to evaluate countermeasures for head and chest protection in higher severity side crashes.

The main area of discussion has been the diameter of the pole and how this relates to the wish to load the head and thorax simultaneously. These two body regions were identified as being the main causes of trauma in impacts into narrow objects. A larger diameter pole was expected to better achieve head and thoracic loading at the same time as well as resulting in a more repeatable test. All regions except the USA initially supported a 350 mm diameter pole. The current FMVSS 201 dynamic pole test utilises a 254 mm diameter pole as does the consumer crash testing procedures used in various countries.

In narrow object side crashes, half of the seriously injured occupants are in crashes of delta-Vs 32 km/h or higher. Only 16% are in crashes with a principal direction of force around 90º while 63% are in frontal oblique narrow object crashes. A recent test program by the USA has shown that an oblique impact using a 254 mm diameter pole was able to simultaneously load the chest and head. Therefore the test procedure proposed by NHTSA will be taken into the validation phase.

The optional FMVSS No. 201 rigid pole side impact test is at 90º and an impact speed of 18 mph (29 km/h) while the oblique pole test is at 75º and 20 mph (32 km/h).

Interior Headform Test

The real world crash data indicated that head injuries were a significant part of side impact trauma even though the results of current regulatory MDB tests do not show a head injury risk. Consequently it is proposed that the IHRA harmonised side impact test procedures include a supplementary interior headform test to ensure that the potential contact points for head impact are evaluated.

The test is based on a development by EEVC of FMVSS 201 using the Free Motion Headform (FMH) in free flight. The test procedure uses the same headform as FMVSS201 and identifies the same interior surface targets except that they are restricted to those liable to be contacted by an occupant's head in side impact accidents.

The proposed Performance Criterion is HIC, calculated from accelerometers within the FMH and transformed into the equivalent HIC for the dummy to be used in the full scale barrier test and/or pole test. For the SID-H3 and the EuroSID, this transform function is:

$HIC_{dummy} = 0.75446\ HIC_{FMH} + 166.4$

However, this may differ according to the selected dummy to be used in the IHRA test procedure.

In view of the anticipated benefits from crash-deployed head protection systems in preventing contact both with internal structures and external objects, it is important not to discourage the provision of these systems. Therefore it is proposed to adopt the same exceptions from the full headform test for those areas which cover the stored deploying systems that is provided for in FMVSS201. Those locations would be tested at a reduced impact speed (5.3 m/s), subject to the demonstration that the deployable device is effective in the proposed IHRA oblique pole test.

The EEVC work confines impact zones to those that are contactable by restrained occupants in side impacts. With front seatbelt wearing rates approaching 80% in the USA, NHTSA has agreed to look at the EEVC's "restrained-only zones" in the validation phase.

Out-of-Position (OOP) and Side Airbag Interaction

Initially, it was agreed that NHTSA and Transport Canada would draft the evaluation procedure based on ISO TR 14933 and the NHTSA/Transport Canada research. Later it was agreed that the recent work under the chairmanship of the Insurance Institute for Highway Safety (IIHS) would also be taken into consideration.

In August 2000, the Side Airbag Out-of-Position Injury Technical Working Group (TWG) chaired by the IIHS released the *"Recommended Procedures for Evaluating Occupant Injury Risk from Deploying Side Airbags"*. The procedures were developed in response to a request by the National Highway Traffic Safety Administration (NHTSA) that industry develops public standards which their member companies would adhere to in the design of future side airbags. The TWG procedures recommends Anthropomorphic Test Devices (ATDs), instrumentation, test procedures, and performance guidelines that should be used for assessing the injury risk of interactions between a deploying side airbag and a vehicle occupant.

The TWG recommendations are intended to minimise the risk of out-of-position injury for that segment of the population believed to be at greatest risk, namely small women, adolescents and children. As such the ATDs deemed most appropriate by the TWG for the evaluation of risk include the SID-IIs, the Hybrid III 5th percentile female and the Hybrid III 6 and 3-year old child ATDs. A series of test procedures has been developed for each of the following inflatable system types: seat mounted airbags, door or quarter panel mounted airbags and roof-rail mounted inflatable systems. Each test is intended to quantify the level of risk to a designated body region and or to evaluate the risk of a specific injury mechanism.

The IHRA SIWG has agreed to take these test procedures into the validation phase which may result in further refinements.

Non-Struck Side Impacts

The Australian DOTARS is involved in a cooperative project with General Motors-Holden's, Monash University and Wayne State University to investigate non-struck side injuries in side impacts. The study includes an in-depth crash vehicle analysis to examine injury patterns and tests to evaluate the kinematics of current dummies against Post Mortem Human Surrogates (PMHS) in the same test configuration. A recent test using WorldSID showed promise as its decoupled spine provided similar kinematics to the PMHS test. The SIWG will be examining this issue in more detail in the next two years.

VEHICLE COMPATIBILITY AND ADVANCED OFFSET FRONTAL CRASH PROTECTION

At the 17th ESV Conference in Amsterdam, the IHRA Steering Committee decided to amalgamate the Advanced Offset Frontal and Vehicle Compatibility Working Groups.

The main thrust of the IHRA Advanced Offset Frontal working group was to promote harmonisation of frontal crash regulations worldwide as a first stage. At the previous ESV Conference Australia announced its strong support for the USA and Europe to introduce both an offset frontal and rigid full frontal test procedure into their respective legislative frameworks in the near future. Australia has had both regulations in place since 2000. These regulations look at the self protection of vehicles of differing sizes and mass.

However, Australia supports the move from self-protection (minimising the injury of individual vehicles) to a holistic approach to minimise injury outcome for the whole vehicle fleet. Therefore the focus must change to vehicle compatibility which looks at equalising crash outcome between unequal crash partners.

Australia has begun a vehicle compatibility program to examine likely candidates for a vehicle compatibility test procedure in cooperation with NHTSA, Ford, Subaru and Renault.

No firm conclusions have been drawn from this work yet and this issue remains one of the most challenging for government, industry and consumer groups worldwide in the new millennium. A detailed summary of the working group's deliberations will be given in the vehicle compatibility technical session.

Australia has done work in developing an energy absorbing truck rear under-run barrier that tries to address the mass and geometric mismatch in truck/car crashes. It is noted that the EEVC has formed a new technical working group to examine this issue.

BIOMECHANICS

The work of the IHRA Biomechanics Working Group (BWG) has focused on defining the biomechanical requirements for a new harmonised side impact test device. In 1999, Australia coordinated a review of

worldwide anthropometric data as part of the BWG's work to define the anthropometry of the WorldSID side impact dummy.

In December 2000, Australia hosted a workshop to launch the prototype WorldSID. It is hoped that this dummy will become the harmonised test device to be used for the new side impact test procedure being developed by the IHRA SIWG.

Unfortunately, the BWG has not yet completed its task to define the biofidelity rating requirements and injury tolerance values for side impact test devices. However, IHRA members are still hopeful that the new WorldSID test device will be able to meet the final set of requirements set out by the BWG.

Following completion of its work in support of developing WorldSID, the IHRA Biomechanics WG's next task will be coordinating the development of an advanced frontal test device. In 1998, Australia participated in the worldwide evaluation of the new advanced frontal dummy, THOR being developed by NHTSA, with encouraging results. At the 17th ESV, Australia reiterated its support for early considerations to make THOR the globally harmonised frontal test dummy for regulatory purposes.

In other areas of biomechanics, research institutes in Australia are continuing to work on establishing the mechanisms of neck (whiplash) and head injuries.

PEDESTRIAN SAFETY

Pedestrians account for just fewer than 20% of fatalities on Australian roads annually.

DOTARS funded the Road Accident Research Unit (RARU) at Adelaide University to build a test rig capable of testing vehicles to the requirements of the draft EEVC pedestrian safety test procedure. DOTARS has been involved in a cooperative project with the Australian New Car Assessment Program (ANCAP) to evaluate the pedestrian-friendliness of popular vehicles available in Australia.

This testing is part of a project to evaluate whether the draft EEVC test procedure is relevant in the Australian situation. This project used the following methodology:

- Investigation of real world crashes
- Reconstructing these crashes
- Generating computer simulations of these crashes
- Testing the vehicles at the relevant impact points to see if the EEVC test procedure can predict the real world injury outcome.

The project indicated that:

- The EEVC head impact test correlated well with the real world accidents analysed
- There was poor correlation with the upper and lower legform tests.

This outcome supports the approach being taken by Japan of regulating for a head impact test as a first stage to improve pedestrian safety. Australia will review the Japanese proposal to see if it is relevant in the Australian situation. However, Australia supports the development of a globally harmonised standard to improve the pedestrian friendliness of vehicle front structures.

RARU has been investigating pedestrian crashes for many years and is continuing its work on head injury mechanisms. This research is being provided to both the IHRA and ISO pedestrian working groups for consideration.

INTELLIGENT TRANSPORT SYSTEMS

House of Representatives Standing Committee on Transport and Regional Services Inquiry into Intelligent Transport Systems

The House of Representatives Standing Committee on Transport and Regional Services initiated an inquiry in late 2002 into aspects of intelligent transport systems (ITS) in Australia. The Committee's report, *Moving on ITS*, was released on 9 December 2002.

The report found that whilst Australia leads the world in certain aspects of ITS research, technology and implementation, it trailed in other areas, such as the adoption of ITS by the freight logistics industry, and continuing problems with interoperability of electronic toll systems.

Whilst the Committee was impressed by current ITS applications in Australia, particularly in New South Wales, Queensland and Victoria, it was aware that Australia lacked specific ITS administrations overseeing the implementation of ITS such as those in the

United States, the European Union and Japan.

Recognising the vital role that ITS will play in the future of transport, the Committee made eleven recommendations, including a greater involvement and commitment by the Federal Government in this area. The Government is currently considering the report and the recommendations contained within it, and is preparing a formal response.

Review of *e*-Transport, the National Strategy for ITS

ITS Australia has engaged a consultant to conduct a review of ***e***-Transport, the National Strategy for ITS, which was launched by the Minister for Transport and Regional Services in December 1999. The Strategy was a cooperative effort by Commonwealth, State and Territory Transport Ministers, in consultation with users and industry, to harness the enormous potential of advanced technologies to improve Australia's transport systems, both public and private.
ITS Australia is also in the process of developing a new Business Plan, designed to be the basis for the successor to ***e***-Transport.

AusLink

In November 2002 the Government launched a green paper on fundamental land transport infrastructure reform, *AusLink: Towards the National Land Transport Plan*. *AusLink* recognises that better use of existing and new infrastructure assets can result from innovative technological solutions to maximise their efficiency. It also acknowledges that the strategic use of ITS has already improved the efficiency of Australian infrastructure by reducing congestion and travel times.

AusLink accepts that ITS applications for the transport and logistics sector also have the potential to improve efficiency and that efficiencies are enhanced even further where ITS and e-commerce applications are integrated across links in the logistics chain, such as intermodal hubs, customs and quarantine processing points.

As a result, *AusLink* will expand the range of solutions that are eligible for Federal Government funding, including new technologies and approaches that will increase the efficiency of existing infrastructure. By widening the range of solutions eligible for Commonwealth funding, *AusLink* has, for the first time, signalled that ITS technologies are a serious and viable consideration in the future development of the national land transport network.

Following extensive consultations, a formal policy statement, or white paper, will be released later this year. *AusLink* is due to commence from July 2004.

INTERNATIONAL HARMONISATION

Australia has been committed to international standards harmonisation for many years and led to Australia becoming a signatory to the UN ECE 1958 Agreement in 2000.

As part of preparations to becoming a signatory, a comprehensive review of the Australian Design Rules was commenced and is due for completion by the end of 2003. The purpose of the review is to align the ADRs with UN ECE Regulations wherever possible, provided safety is not degraded. This will occur through progressive adoption of the appropriate UN ECE Regulations as identified by the review.

As we move into the 21st century, Australia continues to support the IHRA initiative for coordinated research in major areas to improve road safety. However, we must be mindful that the outcomes of the IHRA Working Groups must make their way into globally harmonised regulations.

Only by achieving this final outcome can we be assured of reducing the road toll worldwide.